passes from the coast to the interior are mere footpaths, described by Prof. Drummond, in his charming book "Tropical Africa," as being "never over a foot in breadth, beaten as hard as adamant, and rutted beneath the level of the forest bed by centuries of native traffic. As a rule these footpaths are marvellously direct. Like the roads of the old Romans, they run straight on through everything, ridge and mountain and valley, never shying at obstacles, nor anywhere turning aside to breathe. Yet with this general straightforwardness there is a singular eccentricity and indirectness in detail. Although the African footpath is on the whole a bee-line, no fifty yards of it are ever straight. And the reason is not far to seek. If a stone is encountered, no native will ever think of removing it. Why should he? It is easier to walk round it. The next man who comes that way will do the same. . . . Whatever the cause, it is certain that for persistent straightforwardness in the general, and utter vacillation and irresolution in the particular, the African roads are unique in engineering." No country in the world is better supplied with paths; every village is connected with some other village, every tribe with the next tribe, and it is possible for a traveller to cross Africa without once being off a beaten track. The existence nearly everywhere of a wide coast plain with a deadly climate, and the difficulties attending land transport in a country where the usual beasts of burden, such as the camel, the ox, the horse, and the mule, cannot be utilized, will probably for many years retard the development of the land trade. On the other hand, the Congo with its wide-reaching arms, the Niger, the Nile, the Zambesi, the Shiré, and the great lakes Nyassa, Tanganika, and the Victoria and Albert Nyanzas offer great facility for water transport, and afford easy access to the interior without traversing the pestilential plains. Already steamers ply on most of the great waterways—each year sees some improvement in this respect; and a road is in course of construction from Lake Nyassa to Tanganyika which will tend, if Arab raiders can be checked, to divert inland traffic from Zanzibar to Quilimane, and will become an important link in what must be one of the great trade routes in the future. It is possible, I believe, with our present knowledge of Africa, and by a careful study of its geographical features, to foresee the lines along which trade routes will develop themselves, and the points at which centres of trade will arise; but I have already detained you too long, and will only venture to indicate Sawákin, Mombasa, Quilimane, or some point near the mouth of the Zambesi, and Delagoa Bay, as places on the east coast of Africa which, from their geographical position, must eventually become of great importance as outlets for the trade of the interior.

The future of Africa presents many difficult problems, some of which will no doubt be brought to your notice during the discussion which, I trust, will follow the reading of the African papers; and there is one especially—the best means of putting an end to slave hunting and the slave-trade—which is now happily attracting considerable attention. It is surely not too much to hope that the nations which have been so eager to annex African soil will remember the trite saying that "Property has its duties as well as its rights," and that one of the most pressingly important of the duties imposed upon them by their action is to control the fiends in human form who, of set purpose, have laid waste some of the fairest regions of the earth, and imposed a reign of terror throughout Equatorial Africa.

NOTES.

WE regret to announce that Dr. Peter Griess died very suddenly at Bournemouth on Thursday last week, apparently from an attack of apoplexy. A very skilful manipulator, enthusiastically devoted to his science, a patient and unwearying worker, his death will deprive chemical science of one of its brightest ornaments. He will be chiefly remembered for his discovery of the diazo-compounds, one of the most remarkable classes of substances known to chemistry.

A TELEGRAM from the city of Mexico states that on the night of the 6th instant there occurred the heaviest shocks of earthquake ever recorded in the city. The houses swayed, the walls cracked, and people rushed into the streets to pray. There was for a few moments much apprehension. The phenomenon was preceded by high winds and dust-storms.

A FRIGHTFUL cyclone, involving great destruction of property and loss of life, took place at Havannah on the 4th instant. It is stated to have been the most severe experienced in the West Indies for many years past.

THE inaugural address of St. Thomas's Hospital will be delivered in the theatre on Monday, October 1, at 3 p.m., by Dr. Cullingworth.

THE sixth course of twelve lectures and demonstrations for the instruction of sanitary inspectors will be delivered at the Parkes Museum on Tuesdays and Fridays at 8 p.m., commencing with the 25th instant. The lectures will deal with sanitary subjects generally, and will be delivered by the leading men in the various branches—Sir Douglas Galton, Profs. Corfield and Henry Robinson, Drs. Poore, Louis Parkes, and Charles Kelly, Messrs. Wynter Blyth, Boulnois, Cassal, and Sykes. A nominal fee of five shillings will be charged, and students attending the course will be granted free admission to the Parkes Museum and Library during September, October, and November. The last course was attended by over ninety students, and it is proposed to repeat it twice each year to suit the requirements of persons preparing for the examinations of the Sanitary Institute, as well as of others desirous of obtaining a practical knowledge of sanitary requirements and regulations.

THE September issue of the Kew *Bulletin* continues the notes on colonial fruit, including a long and most interesting report on the fruits of the Island of Dominica. There is also a report from the British Political Officer at Bahmo on the india-rubber trade of the Mogaung district of Upper Burma. The rubber forests, though worked by Chinese, are owned by the Kachins, a tribe inhabiting the borderland between Burma and China.

WE have received Parts 2 and 3 of the second volume of the Journal of the College of Science of the Imperial University of Japan. The former opens with a paper by Dr. Koto "On the so-called Crystalline Schists of Chichibu," a district lying north-west of Tokio, and, geologically speaking, a region complete in itself, and, according to Dr. Koto, typical of the geological formation of the rest of Japan. The essay, which is accompanied by five plates, occupies the greater part of the number. Prof. Okubo gives a brief account of the botany of Sulphur Island, a volcanic and uninhabited island off the Japanese coast. Dr. Ijima and Mr. Murata describe some new cases of the occurrence of *Bothriocephalus liguloides*, Lt. No. 3 is filled with the account of a magnetic survey of all Japan, carried out by order of the President of the Imperial University, the authors being Profs. Knott and Tanakadate. The paper, which is an elaborate one, is divided into five sections: (1) historical retrospect, and general description of the aim and methods of the survey; (2) particular account of the equipment and modes of operation of the northern party; (3) the same details for the southern party; (4) final reduction of the observations, and general conclusions; (5) comparison of results with those of previous observers. In an appendix, Prof. Knott gives an exceedingly interesting sketch of Ino Tadayoshi, a Japanese surveyor and cartographer of the latter half of the last century.

THE current number of the *Westminster Review* contains an article by Mr. Gundry, entitled "China; A New Departure," the "departure" in question being the introduction of mathematics into the curriculum of subjects in the competitive examinations upon which the whole system of Chinese administration is based. Various methods have been proposed from time to time to bring Chinese students into touch with Western learning. Prince Kung, who was Prime Minister in 1866, suggested the erection of a special department presided over by foreign professors for the study of "mathematics," that term being obviously meant to include all branches of physical science. This was done, but public opinion was not ripe for the change, and the result was failure. In 1875 it was proposed, not to instruct Chinese in Western learning, but to teach foreigners the ancient lore of China, and thus enable them to qualify for office. This plan was not tried. Then students were sent abroad to be educated, but they became demoralized, and returned totally out of sympathy with their national traditions. Last year the Censors, who till then were the opponents of all innovation, advocated alterations in the educational system, and the Cabinet, presided over by Prince Chun, the father of the reigning Emperor, thereupon reported in favour of introducing mathematics into the competitive examinations. For the first time, then, provision has been made for spreading through the empire a knowledge of Western science, and there can be no doubt that the ultimate result must be a complete revolution in Chinese thought. The influence of a remote past will be diminished, the necessity for change recognized, and intimacy with "barbarian" learning will do away with the present prejudices against the "barbarians" themselves. But these advantages must not be over-estimated. Though the necessity for studying foreign science is admitted, widespread and intense prejudice has to be conquered, and a new generation will probably have arisen before the full effect of the innovation is felt.

IN the last number of the *Essex Naturalist* (vol. ii., Nos. 7 and 8, p. 113), Prof. Meldola announces that he has at length detected the scent emitted by the male moth *Herminia tarsipennalis*. It has long been known that this insect possessed fan-like structures on the front legs, and it had been surmised that these were secondary sexual characters. The detection of the scent now places the function of these organs beyond doubt, and it is of interest to add that the odour has been recognized as similar to that of artificial essence of jargonelle pear—that is, to amyl acetate. Some of the males of South American butterflies, which are provided with elaborate scent organs, according to Fritz Müller, give off a distinct odour of vanilla.

THE *Oderzeitung* reports the finding in the Lossow district, near Frankfort-on-the-Oder, of about thirty clay vessels of various sizes and patterns, some urns, some pots, deep saucers, flasks, &c. They were filled with the ashes of burnt corpses mixed with sand. The colour was a brownish-yellow; some were broken, and the fractures showed that coal ashes had been mixed with the clay of which they were made. Some bronze needles were found with them, being finished at the top in a semicircular shape. The vessels seemed to have been formed on a lathe, tolerably smooth, regular in shape, and only slightly baked. The largest were about 30 centimetres in diameter at the widest part, and 26 centimetres high. The ornaments were either triangles or semicircles, scratched on the surface with points impressed on the surface. Possibly the site where they were found was a refuge and a place of sacrifice in old German times.

WE have received the Calendar of the University College, Dundee, for the forthcoming session, together with reports on the work of the past year. The progress seems to have been of the usual satisfactory character. A department of dyeing and bleaching has been added since the last session.

AN interesting article has been published in the *Cologne Gazette* from the pen of Herr Gerhard Rohlfs, the African explorer, in which the German plans for rescuing Emin Pasha are subjected to an exhaustive criticism. Herr Rohlfs is of opinion that the proposed expedition may attain its ends if the preliminary preparations are properly and not too slowly conducted, and if the necessary sum of money is subscribed; all that Emin Pasha can want being guns, small cannon, and ammunition. The advance of the expedition must take place slowly and methodically, and depots, commanded by Germans, should be established on the road at intervals from one another represented by from six to eight days' march. From Bagamoyo to Mutansige a distance of 1500 kilometres has to be covered without leaving German territory. From Mutansige to Wadelai the distance is 400 kilometres. The expeditionary force need not include more than 100 Germans, but, as it must be sent out at once if it is to do any good, State aid becomes absolutely necessary. A considerable sum is required. Herr Rohlfs estimates that the expedition conducted by Stanley to the relief of Livingstone cost 2,000,000 marks, and the process of obtaining the sum needed by subscription is far too slow. As this expedition, adds Herr Rohlfs in conclusion, is likely to assist in consolidating German colonial enterprise in Africa, no sacrifice should be spared for carrying it into execution.

WE have received from the Deutsche Seewarte at Hamburg vol. ix. of *Meteorologische Beobachtungen in Deutschland*, containing the observations, for 1886, made at twenty-five stations of the second order, in accordance with the proposal of the Meteorological Congress at Vienna, 1873, that each country should publish the individual observations for a certain number of places. We observe, however, from the preface that in future the Central Office at Berlin will undertake the publication of some of these observations. The volume also contains hourly observations for four stations, and a summary of the storms experienced on the German coasts. These useful statistics of storms have been regularly published since 1878.

THE Meteorological Section of the Report of the Governor of St. Helena on the state of the colony for the past year is interesting, if brief:—"The year under review was dry; the rainfall at Longwood, where Napoleon lived, was 28·74 inches. No lightning has occurred since 1878, and storms are unknown."

WE have received the Report and Proceedings of the Bristol Naturalists' Society for the past year. The members number 224, which seems satisfactory all things considered, yet the Council are far from content. They urge that more cordial recognition and extended support might be expected in a city like Bristol, at a time when science holds so commanding a position for a Society which aims at promoting original scientific research, and at the same time presenting its results in a form intelligible to the general public, and accordingly members are urged to make the benefits of the Society as widely known as possible, while a *conversazione* is to be held next month with a view to directing public attention afresh to its objects and claims. *Sic itur ad astra:* it is thus that a strong and successful Natural History Society is founded. The contents of the Proceedings are attractive and varied, chief amongst them being a "geological reverie" on the Mendips, by Prof. Lloyd Morgan. An Engineering Section was last year added to the Society, and its papers are also published. Looking to this number of the Proceedings it appears to us that the Council have much reason to be proud of the Society, although perhaps it would not be quite prudent to say this in the Annual Report, when more members are required and the balance with the treasurer has fallen very low. We cannot believe that so excellent a Society, which does much good work with such small funds, can lack abundant support in a district such as Bristol and its vicinity.

FROM the Parliamentary paper which has just been issued on the British Museum, it appears that the total number of persons admitted to view the collections has undergone a very great diminution within the past few years. In the year 1882 there were 767,402 visitors to the general collections, as against 501,256 in 1887. This diminution is more than accounted for by the transfer of the natural history collections to South Kensington, for we find that in the latter year there were 358,178 visitors to the Cromwell Road collections, being an increase of 80,000 over the number admitted in 1882. With regard to the number of visitors to particular departments for the purpose of study or research it has increased from 146,891 in 1882 to 182 778 in 1887 to the reading-room, from 1452 in 1885 (when the room was opened) to 11,802 in 1887 to the newspaper-room, and from from 2709 in 1882 to 14,238 in 1887 to the various departments in the new building in Cromwell Road. The students who frequent the reading-room will agree with the principal librarian's remarks as to the inadequacy of the accommodation of that room, and will hope that his recommendation to provide a separate room for "the throng of readers for general information" may be speedily carried out. Amongst the more important donations to the Museum during the past year were the following: stone implements from Japan and Greenland, ancient Peruvian pottery and masks, presented by the trustees of the late Mr. Christy; a collection of Andamanese objects from the Colonial Exhibition, by M. V. Portman; a valuable collection of ethnological objects from the Nicobar Islands, by E. H. Man; a remarkable collection of objects of the Late Celtic period, found in graves at Aylesford; a large collection of stone implements from Japan, presented by Sir Alexander Cunningham. The arrangement of many of the sections in the ethnographical gallery has been altered in the past year. Thus several sections of Asiatic islands have been revised to make room for the two large series from the Andaman and Nicobar Islands. Amongst the Oriental and ethnographical acquisitions during the year were the following: a collection of Indian antiquities, consisting of relic caskets of various kinds with various Buddhist sculptures, &c., presented by General Sir Alexander Cunningham; a number of antiquities from Siam and Burma, presented by E. M. Satow; seventy-six specimens of Chinese porcelain with armorial devices, presented by the Rev. F. Warre; a number of ethnographical specimens collected in the Pacific Islands by H. J. Veitch; and an extensive collection of specimens from New Guinea, including models of houses, boats, &c., collected by H. H. Romilly, and presented by the Queensland Commissioners of the Colonial and Indian Exhibition.

WITH regard to the natural history collections great progress has been made in the arrangement and description. Two cases have been placed on the floor of the Great Hall, illustrating general laws in natural history. The specimens in one case have been presented by Mr. Henry Seebohm, and show that what are regarded as two distinct species of crows (the *Corvus cornix* and the *Corvus corone*) may unite and produce offspring. The second case illustrates the effect of domestication on pigeons. The great collection of birds, which was formed chiefly by the late Marquess of Tweeddale, has been given to the Museum under certain conditions by Mr. R. G. Wardlaw-Ramsay, together with his large ornithological library. The collection comprises nearly 40,000 bird-skins, and is particularly valuable to the Museum, as it is very rich in birds of the Philippine Islands, Andaman Islands, &c., in which the Museum was very deficient. A collection of butterflies, anthropological objects, skins of birds and mammals, sent from Wadelai by Emin Pasha, has reached the Museum. The Commissioners present at the Indian and Colonial Exhibition gave some fine specimens of the flora of Australia and New Zealand. The zoology department is now overcrowded, 270,000 specimens having been added in the space of four years.

THE King of Italy, acting on the recommendation of the Minister of Public Instruction, has issued a decree regulating the manner in which Italy proposes to celebrate the fourth centennial of the discovery of America by Columbus. This will consist mainly in the publication of the collected works of the great navigator, and of all the documents and charts which will throw any light upon his life and voyages. This will be accompanied by a biography of the works published in Italy upon Columbus and the discovery of America from the earliest period down to the present time. The head of the Royal Commission charged with the preparation of this edition is Cesare Correnti, President of the Italian Historical Institute; and among its members are Signors Amari, Cantu, and Desimoni, and the Marquis Doria. An appropriation of 12,000 lire has been made to cover the expenses of this work, which is now fairly undertaken for the first time. Various editors have published portions of the writings of Columbus, as Navarrete the account of his voyages, and Major his letters; but no one has yet collected all his writings into a single edition, though an index to them was published in 1864.

THE British Consul at Chicago in a recent report refers to an interesting experiment in some of the Western States in afforestation. He says that in the vast prairies of the western half of Dakota, Nebraska, and Kansas, the eastern part of Colorado, and in the plains of Dakota and Wyoming, there is an almost total absence of trees, and hence the moisture is very deficient. In the forest regions and amongst the mountains, lumber and firewood have rapidly decreased from the reckless way in which old and young trees have been cut. This waste has been restrained by various Acts, principally by the Timber Culture Law, which regulates the disposal of lands. In Nebraska, fifteen years ago, a voluntary movement was started for the encouragement of planting and forestry in general, and one day in the year, called "Arbor Day," was set apart for that purpose. On that day trees are planted by prominent persons, and by the local bodies. This example has been followed by almost every other State named above, and "Arbor Day" is now a public holiday in those regions, the date being fixed by the Governor. So great has been the progress that in Kansas alone there are now no less than 250,000 acres of artificial forest. The kind of trees planted varies very much with the district and the taste of the planters. White elm is said to be the best tree, being of rapid growth and yet hardy. Oak, walnut, maple, elm, ash, catalpa, pine, tulip-tree, linden, and others, have all been found to flourish.

THE additions to the Zoological Society's Gardens during the past week include a Squirrel Monkey (*Chrysothrix sciurea*) from Guiana, presented by Mr. George Miles; a Rhesus Monkey (*Macacus rhesus* ♀) from India, presented by Mr. J. Witham; a Kinkajou (*Cercoleptes caudivolvulus*) from Venezuela, presented by Dr. A. Batchelor, F.R.C.S.; a Black-backed Jackal (*Canis mesomelas* ♀) from South Africa, presented by Lieut. Lionel de Lautour Wells, R.N.; a Roseate Cockatoo (*Cacatua roseicapilla*) from Australia, presented by Mrs. J. de la Mare; a Sulphur and White-breasted Toucan (*Ramphastos vitellinus*) from Rio Negro, presented by Dr. C. E. Lister; an Alligator (*Alligator mississippiensis*) from Florida, presented by Mr. Michael Millard; two Sharp-nosed Crocodiles (*Crocodilus acutus*) from Nicaragua, presented by Mr. E. A. Williams; a Common Viper (*Vipera berus*), British, presented by Colonel C. S. Sturt; a Grey Lemur (*Hapalemur griseus*) from Madagascar, received in exchange; a Barbary Wild Sheep (*Ovis tragelaphus* ♀) from North Africa, deposited; a Brazilian Cariama (*Cariama cristata*) bred in the Gardens.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1888 *SEPTEMBER* 16-22.

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on September 16

Sun rises, 5h. 39m.; souths, 11h. 54m. 34·6s.; sets, 18h. 10m.: right asc. on meridian, 11h. 38·0m.; decl. 2° 23′ N. Sidereal Time at Sunset, 17h. 54m.

Moon (Full on September 20, 5h.) rises, 16h. 57m.; souths, 21h. 25m.; sets, 2h. 0m.*: right asc. on meridian, 21h. 10·2m.; decl. 17° 45′ S.